## Marine Biology

## International Journal on Life in Oceans and Coastal Waters

Volume 103, 1989

**Editor in Chief** 

O. Kinne Ecology Institute, Nordbünte 23, 2124 Oldendorf/Luhe, Federal Republic of Germany, FAX (0) 41 32/88 83

Editors

M. Anraku

Overseas Fishery Cooperation Foundation Akasaka Twin Tower 17–22, 2-chome Akasaka Minato-ku, Tokyo 107, Japan

T. M. Fenchel

Marine Biological Laboratory University of Copenhagen DK-3000 Helsingør, Denmark

J. P. Grassle

Institute of Marine and Coastal Sciences Center for Coastal and Environmental Science Busch Campus Rutgers University New Brunswick, New Jersey 08903, USA

M. G. Hadfield

Kewalo Marine Laboratory University of Hawaii 41 Ahui Street Honolulu, Hawaii 96813, USA

G. F. Humphrey

Building A 12 University of Sydney Sydney, NSW 2006, Australia

O. Kinne

Ecology Institute Nordbünte 23 2124 Oldendorf/Luhe Federal Republic of Germany J. M. Lawrence

Department of Biology University of South Florida Tampa, Florida 33620, USA

J. Mauchline

Scottish Marine Biological Association Dunstaffnage Marine Research Laboratory P.O. Box 3 Oban PA34 4AD, Argyll, Scotland

R. O'Dor

Department of Biology Dalhousie University Halifax, Nova Scotia B3H 4J1, Canada

J. M. Pérès

Station Marine d'Endoume et Centre d'Océanographie Rue de la Batterie-des-Lions Marseille (7e), France

M. Sara

Università di Genova Via Balbi 5, 16126 Genova, Italy

M. E. Vinogradov

P. P. Shirshov Institute of Oceanology USSR Academy of Sciences 23 Krasikova Moscow 117218, USSR

Assistants to the Editors

R. Friedrich, S. L. Matthews

Ecology Institute, Nordbünte 23, 2124 Oldendorf/Luhe, Federal Republic of Germany



Springer International

## Copyright

Submission of a manuscript implies: that the work described has not been published before (except in the form of an abstract or as part of a published lecture, review, or thesis); that it is not under consideration for publication elsewhere; that its publication has been approved by all coauthors, if any, as well as by the responsible authorities at the institute where the work has been carried out; that, if and when the manuscript is accepted for publication, the authors agree to automatic transfer of the copyright to the publisher; and that the manuscript will not be published elsewhere in any language without the consent of the copyright holders.

All articles published in this journal are protected by copyright, which covers the exclusive rights to reproduce and distribute the article (e.g., as offprints), as well as all translation rights. No material published in this journal may be reproduced photographically or stored on microfilm, in electronic data bases, video disks, etc., without first obtaining written permission from the publisher.

The use of general descriptive names, trade names, trademarks, etc., in this publication, even if not specifically identified, does not imply that these names are not protected by the relevant laws and regulations.

While the advice and information in this journal is believed to be true and accurate at the date of its going to press, neither the authors, the editors, nor the publisher can accept any legal responsibility for any errors or omissions that may be made. The publisher makes no warranty, express or implied, with respect to the material contained herein.

Special regulations for photocopies in the USA: Photocopies may be made for personal or in-house use beyond the limitations stipulated under Section 107 or 108 of U.S. Copyright Law, provided a fee is paid. This fee US\$ 0.20 per page, or a minimum of US\$ 1.00 if an article contains fewer than five pages. All fees should be paid to the Copyright Clearance Center, Inc., 21 Congress Street, Salem, MA 01970, USA, stating the ISSN 0025-3162, the volume, and the first and last page numbers of each article copied. The copyright owner's consent does not include copying for general distribution, promotion, new works, or resale. In these cases, specific written permission must first be obtained from the publisher.

© Springer-Verlag Berlin Heidelberg 1989, Springer-Verlag GmbH & Ko KG, D-1000 Berlin 33. Printed in Germany by Graphischer Betrieb Konrad Triltsch, D-8700 Würzburg

## Contents

Ainley DG → Wahl TR

Alldredge AL → Gotschalk CC

Anger K: Growth and exuvial loss during larval and early juvenile development of the hermit crab Pagurus bernhardus reared in the laboratory 503

Angulo E → Vega MM

Babenerd B → Jochem F

Bagarinao T, Vetter RD: Sulfide tolerance and detoxification in shallow-water marine fishes 291

Bautista MN, Millamena OM, Kanazawa A: Use of kappa-carrageenan microbound diet (C-MBD) as feed of Penaeus monodon larvae 169

Behrens Yamada S: Are direct developers more locally adapted than planktonic developers? 403

Benedict AH → Wahl TR Bienfang PK → Kanda J

Boitel F, Truchot J-P: Effects of sublethal and lethal copper levels on hemolymph acid-base balance and ion concentrations in the shore crab Carcinus maenas kept in undiluted sea water 495

Boucher-Rodoni R, Mangold K: Respiration and nitrogen excretion by the squid Loligo forbesi 333

Burger AE → Wilson RP

ne lal u-y-ee of ve y-ss ne nd .n. o-

Calhoun SW → Lacson JM Castilla JC → Durán LR Chen C-s → Fang L-s Chen Y-wJ → Fang L-s Conquest LD → Kanda J

Dauvin J-C, Gentil F: Long-term changes in populations of subtidal bivalves (Abra alba and A. prismatica) from the Bay of Morlaix (Western English Channel) 63 DeGange AR → Wahl TR

Diano M: Enzymatic data as a criterion for characterizing two populations of Disostichus eleginoides (Notothenioidei)

Dorange G, Le Pennec M: Ultrastructural study of oogenesis and oocytic degeneration in Pecten maximus from the Bay of St. Brieuc 339

Douglas MD → Yancey PH

Downing JA: Precision of the mean and the design of benthos sampling programmes: caution revised 231

Durán LR, Castilla JC: Variation and persistence of the middle rocky intertidal community of central Chile, with and without human harvesting 555

Eapen JT → Patel B Ellis SG, Small LF: Comparison of gutevacuation rates of feeding and nonfeeding Calanus marshallae 175 Erez J → Kuile B ter

Fang L-s, Chen Y-wJ, Chen C-s: Why does the white tip of stony coral grow so fast without zooxanthellae? 359

Fork DC, Larkum AWD: Light harvesting in the green alga Ostreobium sp., a coral symbiont adapted to extreme shade

Fujita S → Shiomi K

Garthwaite RL: Leucine aminopeptidase variation and fitness parameters in the estuarine bivalve Geukensia demissa

Gentil F → Dauvin J-C Gili JM → Sabatès A

Gilron GL, Lynn DH: Assuming a 50% cell occupancy of the lorica overestimates tintinnine ciliate biomass 413

Gotschalk CC, Alldredge AL: Enhanced primary production and nutrient regeneration within aggregated marine diatoms 119

Gowing MM: Abundance and feeding ecology of Antarctic phaeodarian radiolarians 107

Grecay PA: An apparatus for monitoring and controlling turbidity in biological experiments 421

Griffiths WB → Saupe SM

Hagiwara A, Lee C-S, Miyamoto G, Hino A: Resting egg formation and hatching of the S-type rotifer Brachionus plicatilis at varying salinities 327

Hartman WD → Willenz Ph

Hattori H: Bimodal vertical distribution and diel migration of the copepods Metridia pacifica, M. okhotensis and Pleuromamma scutullata in the western North Pacific Ocean 39

Haubenstock N → Schell DM

Haxo FT → Vernet M

Healy JM: Spermiogenesis and spermatozoa in the relict bivalve genus Neotrigonia: relevance to trigonioid relationships, particularly Unionoidea 75

Henley WJ, Ramus J: Photoacclimation of Ulva rotundata (Chlorophyta) under natural irradiance 261

Henley WJ, Ramus J: Optimization of pigment content and the limits of photoacclimation for Ulva rotundata (Chlorophyta) 267

Hill BJ → Wassenberg TJ Hino A → Hagiwara A

Hirche H-J: Egg production of the Arctic copepod Calanus glacialis: laboratory experiments 311

Hosaka M → Shiomi K

Imai I: Cyst formation of the noxious red tide flagellate Chattonella marina (Raphidophyceae) in culture 235

Jaeckle WB, Manahan DT: Feeding by a "nonfeeding" larva: uptake of dissolved amino acids from seawater by lecithotrophic larvae of the gastropod Haliotis rufescens 87

Jochem F. Babenerd B: Naked Dictvocha speculum - a new type of phytoplankton bloom in the Western Baltic 373 Jones DA → Kurmaly K

Kanazawa A → Bautista MN Kanda J, Ziemann DA, Conquest LD, Bienfang PK: Light-dependency of nitrate uptake by phytoplankton over the spring bloom in Auke Bay, Alaska 563

Keller AA. Riebesell U: Phytoplankton carbon dynamics during a winter-spring diatom bloom in an enclosed marine ecosystem: primary production, biomass and loss rates 131

Kikuchi T → Shiomi K

Kuile B ter, Erez J. Padan E: Mechanisms for the uptake of inorganic carbon by two species of symbiont-bearing foraminifera 241

Kuile B ter, Erez J, Padan E: Competition for inorganic carbon between photosynthesis and calcification in the symbiontbearing foraminifer Amphistegina lob-

Kurmaly K, Yule AB, Jones DA: Effects of body size and temperature on the metabolic rate of Penaeus monodon 25

Lacson JM. Riccardi VM. Calhoun SW. Morizot DC: Genetic differentiation of bicolor damselfish (Eupomacentrus partitus) populations in the Florida Keys

Larkum AWD → Fork DC Lawrence-Berrey R → Yancey PH Lee C-S → Hagiwara A Lenanton RCJ → Loneragan NR Le Pennec M → Dorange G

Lesser MP → Walker CW Lewis ME → Ritz DA

Loneragan NR, Potter IC, Lenanton RCJ: Influence of site, season and year on contributions made by marine, estuarine, diadromous and freshwater species to the fish fauna of a temperate Australian estuary 461 Lynn DH → Gilron GL

MacDiarmid AB: Moulting and reproduction of the spiny lobster Jasus edwardsii (Decapoda: Palinuridae) in northern

New Zealand 303 Maillard C → Silan P

Manahan DT → Jaeckle WB Mangold K → Boucher-Rodoni R Marigómez JA → Vega MM

Ma Shen → Ritz DA

McClary DJ, Mladenov PV: Reproductive pattern in the brooding and broadcasting sea star Pteraster militaris 531

McHugh D: Population structure and reproductive biology of two sympatric hydrothermal vent polychaetes, Paralvinella pandorae and P. palmiformis 95

McKeen GL → Sulkin SD Millamena OM → Bautista MN Neori A → Vernet M Nöldeke C → Wilson RP

Ó Foighil D: Planktotrophic larval development is associated with a restricted geographic range in Lasgea, a genus of brooding, hermaphroditic bivalves 349 Osman RW → Sanders JG

Padan E → Kuile B ter Pagès F → Sabatès A

Patel B, Eapen JT: Physiological evaluation of naphthalene intoxication in the tropical acrid clam *Anadara granosa* 193

Patel B, Eapen JT: Biochemical evaluation of naphthalene intoxication in the tropical acrid blood clam *Anadara granosa* 203

Potter IC → Loneragan NR

Rainbow PS: Copper, cadmium and zinc concentrations in oceanic amphipod and euphausiid crustaceans, as a source of heavy metals to pelagic seabirds 513

Ramus J → Henley WJ Riccardi VM → Lacson JM

Riccardi VM → Lacson JM
Riddle MJ: Precision of the mean and the
design of benthos sampling pro-

grammes: caution advised Riebesell U → Keller AA

Riebesell U → Keller AA Riedel GF → Sanders JG

Ritz DA, Lewis ME, Ma Shen: Response to organic enrichment of infaunal macrobenthic communities under salmonid seacages 211

Sabatès A, Gili JM, Pagès F: Relationship between zooplankton distribution, geographic characteristics and hydrographic patterns off the Catalan coast (Western Mediterranean) 153

Sanders JG, Osman RW, Riedel GF: Pathways of arsenic uptake and incorporation in estuarine phytoplankton and the filter-feeding invertebrates Eurytemora affinis, Balanus improvisus and Crassostrea virginica 319

Saupe SM, Schell DM, Griffiths WB: Carbon-isotope ratio gradients in western arctic zooplankton 427

Saupe SM → Schell DM Schell D → Saupe SM

Schell DM, Saupe SM, Haubenstock N: Bowhead whale (*Balaena mysticetus*) growth and feeding as estimated by δ<sup>13</sup>C techniques 433

Shiomi K, Hosaka M, Fujita S, Yamanaka H, Kikuchi T: Venoms from six species of marine fish: lethal and hemolytic activities and their neutralization by commercial stonefish antivenom 285

Silan P, Maillard C: Biology of Serranicotyle labracis, ectoparasite of Dicentrarchus labrax (Teleostei): contribution to the study of its populations 481 Small LF → Ellis SG

Starczak VR → Weinberg JR

Stickney DG, Torres JJ: Proximate composition and energy content of mesopelagic fishes from the eastern Gulf of Mexico 13

Sulkin SD, McKeen GL: Laboratory study of survival and duration of individual zoeal stages as a function of temperature in the brachyuran crab Cancer magister 31

Talluri P → Ugolini A Thorpe JP → Ward MA Torres JJ → Stickney DG Truchot J-P → Boitel F

Ugolini A, Talluri P, Vannini M: Astronomical orientation and learning in the shrimp *Palaemonetes antennarius* 489

Vannini M → Ugolini A

Vega MM, Marigómez JA, Angulo E: Quantitative alterations in the structure of the digestive cell of *Littorina littorea* on exposure to cadmium 547

Vernet M, Neori A, Haxo FT: Spectral properties and photosynthetic action in red-tide populations of *Prorocentrum micans* and *Gonyaulax polyedra* 365 Vetter RD → Bagarinao T

Volckaert F, Zouros E: Allozyme and physiological variation in the scallop *Placopecten magellanicus* and a general

model for the effects of heterozygosity on fitness in marine molluscs 51

Conten

Wahl TR, Ainley DG, Benedict AH, De-Gange AR: Associations between seabirds and water-masses in the north ern Pacific Ocean in summer 1

Walker CW, Lesser MP: Nutrition and development of brooded embryos in the brittlestar Amphipholis squamata: do endosymbiotic bacteria play a role? 519

Ward MA, Thorpe JP: Assessment of space utilisation in a subtidal temperate bryozoan community 215

Wassenberg TJ, Hill BJ: Diets of four decapod crustaceans (Linuparus trigonus, Metanephrops andamanicus, M. australiensis and M. boschmai) from the continental shelf around Australia 16

Wei SL, Young RE: Development of symbiotic bacterial bioluminescence in a nearshore cephalopod, Euprymna scolopes 541

Weinberg JR, Starczak VR: Morphological divergence of Eastern Pacific and Caribbean isopods: effects of a land barrier and the Panama Canal 143

Willenz Ph, Hartman WD: Micromorpho ogy and ultrastructure of Caribbean sclerosponges. I. Ceratoporella nicholso and Stromatospongia norae (Ceratoporellidae: Porifera) 387

Wilson BLH → Wilson RP Wilson M-PT → Wilson RP

Wilson RP, Burger AE, Wilson BLH, Wilson M-PT, Nöldeke C: An inexpensive depth gauge for marine animals 275

Yamanaka H → Shiomi K

Yancey PH, Lawrence-Berrey R, Douglas MD: Adaptations in mesopelagic fishes I. Buoyant glycosaminoglycan layers in species without diel vertical migrations 453

Young RE → Wei SL Yule AB → Kurmaly K

Ziemann DA → Kanda J Zouros E → Volckaert F

Indexed in Current Contents

tents ity

De-

rth-

d de-he o en-519

rate

de-us,

e 161 sym-

ogi-d i i g phol-olsoni

pen-

glas ishes. rs in ons